July 18, 2005
GFK-2244Q

# IMPORTANT PRODUCT INFORMATION

**READ THIS INFORMATION FIRST**

## Product: PACSystems™ RX7i CPUs

**IC698CPE010-EJ (300 MHz), CPU Firmware Version 3.11**
**IC698CPE020-EJ (700 MHz), CPU Firmware Version 3.11**

Release 3.11 of the RX7i CPU fixes the following issues:

- In earlier versions, EGD continues to produce exchanges when the CPU is in a STOP-HALT condition. In version 3.11, Ethernet Global Data (EGD) will stop producing exchanges when the CPU enters a STOP-HALT condition.
- In earlier versions, if the user did not supply a value for the Bit value parameter (B1) of the SHIFT-LEFT and SHIFT-RIGHT functions, this parameter was not initialized. In version 3.11, if the user does not provide a value for the Bit Value parameter (B1) the Bit value used will be 0.

For additional information, see “Problems Resolved by Version 3.11” on page 6.

This update applies only to the CPU firmware. The current Ethernet firmware version remains 3.00.

## *Version Identification*

| *Hardware Identification* | | | *Firmware Identification* | |
|---|---|---|---|---|
| **Catalog Number** | **Circuit Board ID** | | **Firmware ID** | **Version** |
| IC698CPE010-EJ (CPU) | VMIVME-007633-002 Rev. F | | CPU Primary | 3.11 Build 27A2 |
| IC698CPE020-EJ (CPU) | VMIVME-007633-002 Rev. F | | CPU Boot | 1.00 Build 21B2 |
| IC698CPE010/020 (Ethernet) | EX8A1_F2_R03 | | Ethernet TCP | 3.00 Build 15A1 |
| | | | Ethernet Boot | 1.50 Build 46A1 |

| *CPU Programmable Parts* | |
|---|---|
| **Part ID** | **Revision** |
| Memory PLC | 5/19/03 |
| Interrupt PLD | 5/11/02 |
| FPGA | 6/18/03 |
| MCU | 11/03/03 |
| BIOS | 1.04 |

| *Ethernet Programmable Parts* | |
|---|---|
| **Part ID** | **Revision** |
| PLD | 6006_U6_PLD_A.jed |

## *Updates*

Using the firmware upgrade utility:

a CPE010-Ax, Bx, Cx, Dx, Ex can be field upgraded to a CPE010-AJ, BJ, CJ, DJ, EJ

a CPE020-Ax, Bx, Cx, Dx, Excan be field upgraded to a CPE020-AJ, BJ, CJ, DJ, EJ

a CRE020 can be converted to a CPE020 with firmware version 3.11

You may order the appropriate field upgrade kits or download them at no charge from the web at http://www.gefanuc.com/

IC698CPE010: 44A752252-G11
IC698CPE020: 44A752255-G11

## CPU Functional Compatibility

For Ethernet functional compatibility, see page 5.

| *Subject* | *Description* |
|---|---|
| **Programmer Version Requirements** | ■ Proficy™ Machine Edition Logic Developer PLC 5.0 Service Pack 3 HotFix 3 or later must be used for Release 3.10 new features.<br>■ Proficy Machine Edition Logic Developer PLC 5.0 Service Pack 3 or later must be used for Release 3.00 new features.<br>■ Proficy Machine Edition Logic Developer PLC 4.5 or later must be used for Release 2.56 new features.<br>■ Proficy Machine Edition Logic Developer PLC 4.0 SP3 Special 2 or later must be used for Release 1.50 new features.<br>■ Proficy Machine Edition Logic Developer PLC 4.0 or later must be used to configure and program the RX7i. |
| **C Toolkit Compatibility** | The C Toolkit for PACSystems is distributed with Machine Edition Logic Developer 4.0 or greater. Toolkit build 21A2 or later is required for use with the RX7i. Toolkit build 47A1 or later is required for use with the Release 2.00 features. Please note: The Series 90-70 Toolkit (IC641SWP709/719) is not compatible with PACSystems RX7i. |
| **Series 90-70 Expansion Rack Compatibility** | Series 90-70 expansion racks are supported by the PACSystems RX7i.<br>PACSystems RX7i CPUs and the RX7i Ethernet Module do not operate in a Series 90-70 rack. |
| **Series 90-70 Main Rack Compatibility** | Series 90-70 Main Racks cannot be used in a PACSystems RX7i system.<br>PACSystems RX7i CPUs and the RX7i Ethernet Module do not operate in a Series 90-70 rack. |
| **Single Width I/O Module Compatibility** | The following additional single width I/O modules are supported by the PACSystems RX7i :<br>Analog Input, 64 Channel, 16 bit resolution, Voltage (IC697VAL264)<br>Analog Input, 12 bit, 32 Channel single-ended or 16 Channel differential (IC697VAL132)<br>Analog Output, 32 Channel, 12 bit (IC697VAL301)<br>Digital Input, 64 Point (IC697VDD100)<br>Relay Output, 64 Point (IC697VDR151)<br>Digital Output, 64 Point (IC697VDQ120)<br>Eight Channel RTD/Strain Bridge (IC697VRD008)<br>**Note:** These modules are fully integrated when installed in the Main Rack. When installed in an expansion rack the module must be configured as a generic VME module. |
| **Insulating Strips for High Voltage Modules** | An insulator strip is required on a high voltage module that is installed to the immediate right of a module with a metal faceplate. Insulating strips should be installed on the following modules that have versions earlier than:<br>IC697MDL240**D** IC697MDL640**E**<br>IC697MDL241**D** IC697MDL340**G**<br>IC697MDL250**G** IC697MDL341**E**<br>IC697MDL251**E** IC697MDL350**F**<br>**Note:** Current versions of these modules are shipped with the insulators installed. The strip is visible on the back of the printed wiring assembly. The RX7i rack is shipped with an Insulator Kit that includes enough parts to update three Series 90-70 I/O modules, a BEM713 (Bus Transmitter) module, and a BEM731 (Genius Bus Controller) module. |

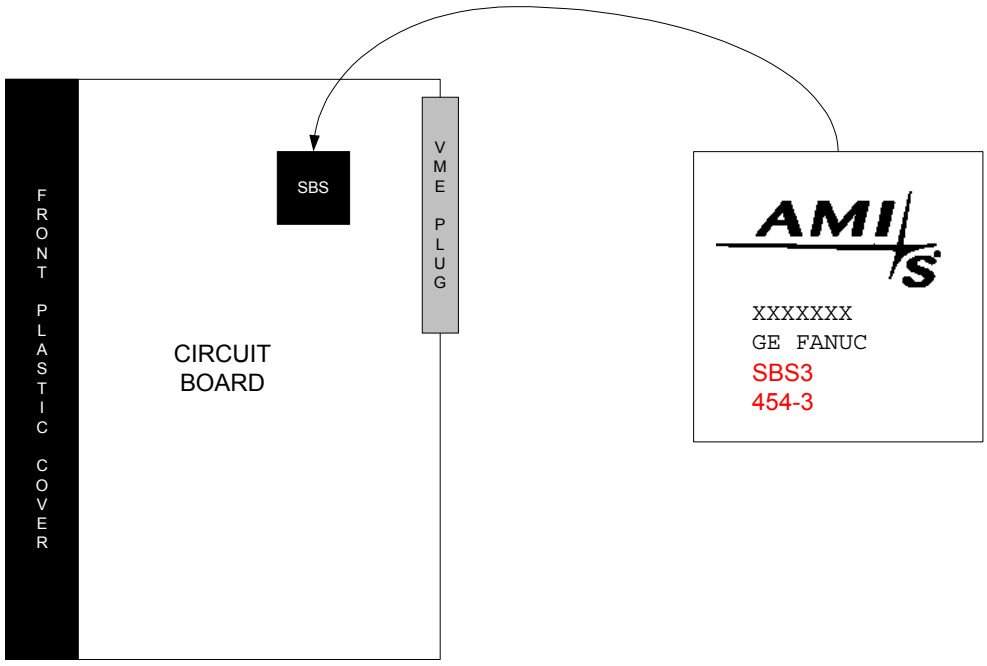
## *Series 90-70 Modules' Compatibility with Rx7i*

The following tables describe the requirements that each Series 90-70 module must meet in order to be installed in the RX7i system.

***Series 90-70 Modules that have field upgradeable firmware:***

| *Module* | *Hardware version required* | | *Firmware version required* | *Firmware Upgrade Kit* | *Important Product Information* |
|---|---|---|---|---|---|
| | *when installed in the main rack* | *when installed in an expansion rack* | | | |
| 90-70 GBC IC697BEM731 | SBS3*, and B or higher | B or higher | 5.8 or higher | 44A751619-G01 | GFK-2275 |
| 90-70 PCM IC697PCM711 | SBS3*, and PCMA1 R05 or higher | PCMA1 R05 or higher | 4.05 or higher | 44A286371-G15 | GFK-1081 |
| 90-70 CMM IC697CMM711 | SBS3*, and PCMA1 R05 or higher | PCMA1 R05 or higher | 4.20 or higher | 44A731238-G07 | GFK-0754 |
| 90-70 DLAN IC697BEM763 | SBS3*, and G01R03 or higher | Not allowed | 3.00 or higher | None | GFK-1048 |
| 90-70 High Speed Counter IC697HSC700 | SBS3*, and A or higher | A or higher | 1.21 or higher | 44A737511-G03 | GFK-1169 |
| 90-70 Analog Input IC697ALG230 | SBS3*, and A or higher | A or higher | 1.6 or higher | 44A731228-G03 | GFK-1377 |
| 90-70 Analog Output IC697ALG320 | SBS3*, and E or higher | C or higher | 1.4 or higher | None | None |

***SBS3.** All modules installed in the RX7i's main rack that use the SBS VME interface chip are required to have version 3 of the chip. To determine whether your module meets this requirement, look at the large square ASIC located near the top right corner of the circuit board. The chip must have the following markings. The most critical items are the last two lines: "SBS3" and "454-3. " (GE Fanuc started shipping modules with SBS3's in 1998.)



***Series 90-70 Modules that do not have field upgradeable firmware:***

| *Module* | *Hardware version required* | *Notes* |
|---|---|---|
| Standard-width 90-70 BTM IC697BEM713 | H or higher | |
| Single-slot-width 90-70 BTM IC687BEM713 | B or higher. Version A with assembly rev "R08" or higher is also allowed. | |
| 90-70 BRM IC697BEM711 | M or higher | |
| 90-70 Analog Expander Current IC697ALG440 | B or higher | |
| 90-70 Analog Expander Voltage IC697ALG441 | B or higher | |
| IC697MDL240 | A or higher | D and higher have plastic insulator |
| IC697MDL241 | A or higher | D and higher have plastic insulator |
| IC697MDL250 | E or higher | G and higher have plastic insulator |
| IC697MDL251 | A or higher | E and higher have plastic insulator |
| IC697MDL252 | A or higher | E and higher have plastic insulator |
| IC697MDL253 | A or higher | E and higher have plastic insulator |
| IC697MDL254 | A or higher | E and higher have plastic insulator |
| IC697MDL340 | E or higher | G and higher have plastic insulator |
| IC697MDL341 | B or higher | E and higher have plastic insulator |
| IC697MDL350 | B or higher | F and higher have plastic insulator |
| IC697MDL640 | A or higher | E and higher have plastic insulator |
| IC697MDL651 | E or higher | |
| IC697MDL652 | C or higher | |
| IC697MDL653 | B or higher | |
| IC697MDL654 | C or higher | |
| IC697MDL671 | A or higher | |
| IC697MDL740 | D or higher | |
| IC697MDL750 | G or higher | |
| IC697MDL752 | E or higher | |
| IC697MDL753 | A or higher | |
| IC697MDL940 | B or higher | |

## *Ethernet Functional Compatibility*

| *Subject* | *Description* |
|---|---|
| **SRTP and EGD Performance Differs from Series 90-70** | SRTP and EGD performance in the RX7i differs slightly from the Series 90-70. Each RX7i Ethernet Interface supports a greater number of SRTP connections and EGD exchanges.<br>Please also note that the RX7i currently has several SRTP and EGD operational restrictions when compared to the Series 90-70. When migrating Series 90-70 Ethernet applications to the RX7i, please carefully read the "Ethernet Operational Notes" section on page 20. |
| **Series 90-70 LAN Interface Modules (IC697CMM741 and IC697CMM742) not Supported by RX7i** | Please note that the Series 90-70 LAN Interface Modules (IC697CMM741 and IC697CMM742) are not supported by the RX7i and should not be placed in an RX7i rack. The RX7i CPU contains an embedded Ethernet Interface. If additional Ethernet Interfaces are required, the RX7i Ethernet Module (IC698ETM001) should be used. |
| **Programmer Version Requirements** | Proficy Machine Edition Logic Developer PLC 5.0 Service Pack 3 or later must be used to program the PLC CPU for Modbus/TCP operation. |
| **CIMPLICITY® Plant Edition Version Requirements** | CIMPLICITY Plant Edition 6.1 Service Pack 1a with Update 040204_s90tcp_6101 or Service Pack 2 or later must be used for Ethernet communications with PACSystems. |

## CPU Problems Resolved by Version 3.11

| Subject | Description |
|---|---|
| EGD continues to produce when the CPU is in STOP-HALT mode. | In earlier versions, EGD continues to produce exchanges when the CPU is in a STOP-HALT condition. This problem has been corrected in version 3.11 so that EGD production stops when the CPU is in STOP-HALT.<br>As of release 3.11 when the CPU goes to STOP-HALT (error sweep), the hardware watchdog timer is tripped and the CPU will be unresponsive. The CPU should be power cycled to recover. In most cases the fault table will be preserved when power cycled with a battery. |
| Bit Value parameter for Shift-Right and Shift-Left function blocks not initialized. | In earlier versions, if the user does not provide an input value for the Bit value parameter (B1), the value used for the shift would be random (0 or 1).<br>There is no problem when a value is specified for theB1 parameter.<br>This problem has been corrected so that, if a value is not specified for B1, a 0 will be shifted into the resulting open bits. |

## Ethernet Problems Resolved by Version 3.00

| Subject | Description |
|---|---|
| **IO Fault Table Web Page Display Problem** | The I/O Fault Table web page now displays correct values for various parameters such as I/O Bus, and Bus Point. |
| **IO Fault Table Web Page Restriction** | The I/O Fault Table web page now supports the field of 'fault description'. |
| **%L on Reference Table Web Page** | %L data is now displayed on reference table web page. |
| **Javascript Error** | The following Javascript error is no longer seen when accessing the I/O and PLC Fault Table web pages using Internet Explorer: " 'self.document.reform.log_textbox' is null or not an object" |
| **SNTP Error Logged When Not Configured** | The Ethernet Interface no longer logs an SNTP event in the Ethernet exception log (Event = 29H, Entry 2 = 01H) even though Ethernet time synchronization is configured as None instead of SNTP. |
| **Station Manager "EGDCMD st" May Report Incorrect Data** | The EGD sample due time and EGD exchange state as reported by the "EGDCMD st" command are now accurate. |
| **Avoid Too-rapid ARP Cache Flushing** | The Advanced User Parameter "fflush" can now be set lower than 5 seconds (down to 1 second). |
| **Older Network Devices And Nuisance Faults** | The Ethernet interface no longer gives nuisance faults when connected to certain network devices, specifically those hubs that do not complete speed negotiation in 500 ms or less. |
| **"Internal Error" Exception when Duplicate EGD Producer IDS** | An exception (Entry = 28, Entry 2= 24) will no longer appear in the exception log if there is another EGD producer on the network using the same Producer ID as the Ethernet interface. |
| **EGD Tally Inconsistency** | The EGD consumption transfer tally "DataRx" no longer increments if the incoming EGD message is discarded due to signature mismatch. |
| **Blink Code "2-8" on Ethernet Interface After Multiple Rapid Power Cycles** | The Ethernet Interface no longer displays a blink code of "2-8" after rapid multiple power cycles. Resetting the Ethernet Interface returned it to normal operation. |
| **Don't "Loopback" EGD** | The loopback IP address 127.0.0.1 may now be used to produce and consume EGD. |
| **Incorrect COMMREQ Status Word for Invalid Read Exchange EGD command** | When an EGD Read Exchange command references out-of-range local PLC reference memory, the Ethernet interface now returns COMMREQ status word 9085H and does not write any data to local PLC reference memory, as would be expected. |
| **Incorrect Value in SRTP Error PDU Message** | When the SRTP Server detects an internal SRTP processing the SRTP Destinations response, it now inserts a correct error code value into the resulting SRTP Error PDU message (i.e. the internal SRTP error value is now less than 40 (= 28H)). |

| *Subject* | *Description* |
|---|---|
| **Network Offline Fault at Powerup With Non-default AUP Settings** | The Ethernet Interface no longer logs a network offline exception (Event = 20, Entry 2 = 1) when powered up with non-default settings for “IduplexXX” or “IspeedXX” AUP parameters. |
| **Station Manager “EGDCMD st” May Report Incorrect Sample Time** | The EGD sample due time for Produced exchanges as reported by the “EGDCMD ST” (= EGD Statistics) command is now correct. |

## *New Ethernet Features and Enhancements (Version 3.00)*

Release 3.00 of the RX7i Ethernet interfaces provides the following features and enhancements.

**Support for up to 32 SRTP Channels**:

SRTP (Client) Channels provides communication from PLC to PLC, or from the PLC to a host application SRTP server, over an Ethernet Network using the SRTP/TCP/IP protocol.

Up to 80 SRTP/TCP connections total, consisting of up to 48 SRTP Server connections and up to 32 Client Channels.

PACSystems Ethernet Interfaces support the same set of Channel commands as Series 90 Ethernet Interfaces, and use identical Command Block formats. Please refer to the *PACSystems TCP/IP Ethernet Communications Manual*, GFK-2224C or later) for details. Note that specifying a Remote PLC or Host Application SRTP Server by name is not supported in PACSystems. The Channel Commands are:

**Establish Read Channel (2003).** Requests that a channel be established between the Local PLC (client) and a Remote PLC (server) and that data be read from the Remote PLC and transferred to the Local PLC.

**Establish Write Channel (2004)**. Requests that a channel be established between the Local PLC and a Remote PLC and that data from the Local PLC be transferred to the Remote PLC (read from the client and written to the server).

**Send Information Report (2010).** Requests that a specified block of memory within the Local PLC be transferred to a Host Application SRTP Server (rather than a Remote PLC).

**Abort Channel (2001)**. This is a local command: communication occurs only between the Local PLC and the local Ethernet Interface. It requests that the Ethernet interface stop and disconnect a specific channel from the Remote PLC. The interface also allows for a way to specify all channels be aborted.

**Retrieve Detailed Channel Status (2002).** This is a local command: communication occurs only between the Local PLC and the local Ethernet Interface. It requests that the current Detailed Channel Status Data (DCSD) words be returned for the specified channel number. The DCSD consists of two words that contain the last channel status codes that occurred and an active/inactive channel indicator.

**Support for Modbus/TCP Server**

Supports Modbus Conformance classes 0, 1, and 2. The Modbus/TCP Server supports up to 16 simultaneous connections. These connections are not shared with any other applications. Other TCP-based application protocols such as SRTP Server use a different set of TCP Connections.

## CPU Restrictions and Open Issues

| Subject | Description |
|---|---|
| **Battery installation** | When installing a new battery, when there currently is no battery installed, the battery must be installed while the CPU has power. Failing to follow this procedure could result in the CPU not powering up.<br>If a battery is installed while power is off (and there was no battery previously installed), and the CPU fails to power up, simply remove the battery, power cycle the CPU and then install the battery. |
| **Ethernet Disconnect During Word for Word Change** | If the Ethernet connection is broken during a word-for-word change, the programmer may not allow a subsequent word-for-word change after reconnecting due to the fact that it thinks another programmer is currently attached. If this occurs, you should go offline and then back online again. |
| **Non-GE Fanuc VME Modules Operating as VME Masters** | Non-GE Fanuc VME modules operating as VME bus masters have not been tested with the RX7i. Users interested in integrating this type of functionality should contact technical support. |
| **Store of Hardware Configuration with Multiple GBCs** | Storing a hardware configuration containing two or more GBCs twice may cause one GBC to fail configuration. Clearing the hardware configuration between stores will prevent this fault from being generated. |
| **Simultaneous Clears, Loads and Stores Not Supported** | Currently, the RX7i does not support multiple programmers changing CPU contents at the same time. The programming software may generate an error during the operation. |
| **Power Cycle During Online Edit** | If the user stores a folder to flash that is configured to power up from flash and then subsequently power is cycled in the middle of a Online Edit session, the programmer will still indicate that the Online Edit session is in progress after the power cycle. The user should cancel the Online Edit session to continue. |
| **Fault Reporting With Analog Expanders** | For fault reporting when an analog expander is used in a Series 90-70 Expansion Rack, a special case exists when the ALG230 base module is in slot 2 and an expander module is present in slot 9. In this case, if any expander module loses communication with the base module, then the fault reports for all 16 channels for that expander display the slot number as 0. The circuit number will be a value from 9 to 120, as shown in the following table. The I/O reference address for each channel is displayed as blank.<br>SLOT EXPANDER CIRCUIT NUMBERS<br>3 1 9-24<br>4 2 25-40<br>5 3 41-56<br>6 4 57-72<br>7 5 73-88<br>8 6 89-104<br>9 7 105-120<br>For fault reporting when an analog expander is used in a PACSystems RX7i rack, a special case exists when the base is in slot 4 and an expander is present in slot 11. In this case, the slot number for a faulty expander is always displayed as slot 2, and the circuit number will display according to the slot used for the expander, as shown in the following table. The I/O reference address for each channel is displayed as blank.<br>SLOT CIRCUIT NUMBERS<br>6 25-40<br>7 41-56<br>8 57-72<br>9 73-88<br>11 105-120 |
| **Power Cycle During Write to Flash** | If the CPU is power cycled during the process of writing to flash, and is configured to power up from flash, a fault will be generated on power up. |

| *Subject* | *Description* |
|---|---|
| **Hardware Configuration Not Equal After Changing Target Name** | If the user stores a hardware configuration to flash which indicates that “Logic/Config Power up Source” is set to “Always Flash” or “Conditional Flash” and then subsequently changes the name of the target in the programming software, the hardware configuration will go Not Equal and will not Verify as equal. |
| **PLC and IO Fault Tables May Need to be Cleared Twice to Clear Faulted State** | Both PLC and IO fault tables need to be cleared to take the CPU out of Stop/Fault mode. If one of the tables contains a recurring fault, the order in which the tables are cleared may be significant. If the CPU is still in Stop/Fault mode after both tables are cleared, try clearing the fault tables again. |
| **VME Modules Using Program Type AM Codes** | When Block Transfers are enabled with a VME memory region that uses one of the program type AM Codes, the Rx7i CPU sometimes generates block transfer (BLT & MBLT) cycles to access the associated VME memory. Therefore, if you have a VME memory region configured to use one of the program type AM Codes (AM Codes 3Ah, 3Eh, 0Ah, or 0Eh), be sure to follow at least one of these two rules:<br>a) The memory region's Interface Type parameter must not be set to "Qword Access (64-bit)", and the VME Block Transfer parameter must be set to "Disabled".<br>-OR-<br>b) The system may not contain any "program" and "data" VME memory regions with overlapping VME addresses. (If more than one VME module were to respond to a BLT or MBLT cycle, a system error could result.) |
| **Setting Force On/Off by Storing Initial Value** | Once a force on or force off has been stored to the PLC, the user cannot switch from force on to force off or vice-versa directly by downloading initial values. The user can turn off the force by doing a download, and then change the force on or off by another download. |
| **CMM Comm_req Restriction** | Due to an issue in the CMM firmware, the SNP COMM_REQ Read System Memory (7202) executed on a CMM module does not execute correctly for lengths greater than 760 words. Incorrect data is written to the SNP Master. Users should not use lengths greater than 760 words. |
| **Number of Active Programs Returned as Zero** | The SNP request Return Controller Type and ID currently returns the number of active programs as zero. |
| **Serial I/O Failure at 115K During Heavy Interrupt Load** | Rare data corruption errors have been seen on serial communications when running at 115K under heavy interrupt load on the PLC. Under heavy load applications, users should restrict serial communications to 57K or lower. |
| **RAND_MAX and rand() Function Incompatible** | In the C Toolkit, the RAND_MAX system variable is defined as a 32-bit integer. However, the rand() function returns a 16-bit integer. By definition, rand() should return an integer between 0 and RAND_MAX. |
| **Incorrect Commreq Status For Invalid Program Name** | The program name for PACSystems is always "LDPROG1". When another program name is used in a commreq accessing %L memory, the error that is generated is a 05D5, which is an invalid block name. |
| **Unable To Communicate Through Some Third Party Serial Cards** | PACS Systems serial ports do not work with some third party serial cards. |
| **SNP ID Not Always Provided** | Unlike the Series 90, the PACSystems CPU’s SNP ID will not appear in the Machine Edition programmer Show Status display. Service Request 11 will always return zeros. |
| **Bus Read or Write May Return Status of 5 Instead of 4.** | In some cases, the Bus Read/Write Status Word returned may be 4 instead of 5 when the ending address is out of range. |
| **Must Have Logic If Powering-Up From Flash** | If the application will configure the CPU to retrieve the contents of flash memory at power-up, be sure to include logic along with hardware configuration when saving to flash memory. |

| *Subject* | *Description* |
|---|---|
| **PACSystems C Toolkit Definition For Unpacked BCD 4 Digit Year Structure Wrong** | The definition of unpacked_bcd_tod_4_rec in release 1.0 and earlier of the PACSystems C Toolkit is incorrect. The definition should be:<br>struct unpacked_bcd_tod_4_rec{<br>T_WORD huns_year;<br>T_WORD tens_year;<br>T_WORD month;<br>T_WORD day_of_month;<br>T_WORD hours;<br>T_WORD minutes;<br>T_WORD seconds;<br>T_WORD day_of_week;<br>}; |
| **GBC COMMREQ status address** | Do not specify %I or %Q memory for the status address location for a COMMREQ to the GBC70. Memory types %R, %AI, and %AQ work properly. In the %I and %Q case, the COMMREQ completes with a status of 0. |
| **Powering Up Unconfigured Expansion Racks During Run Mode** | Powering up an expansion rack that is currently not configured will cause the sweep time to increase significantly (approximately 30-40 ms for each rack) for one sweep. If the PLC is in run mode, and multiple expansion racks are powered up at the same time, the software watchdog timer may go off. The user should ensure that all expansion racks are configured before being powered up, or power up the expansion racks while the PLC is in stop mode, or increase the software watchdog timeout appropriately, in order to avoid this problem. |
| **CPU may not detect low-battery condition** | PACSystems CPUs may not detect a low-battery condition early enough to provide a meaningful warning to the user to replace the battery. A battery with very low capacity may still have a terminal voltage high enough to report that it is a good battery. In this case, when the battery starts supplying the memory power (battery backup), the battery voltage would quickly drop to unacceptable levels, with little warning to the user before failure. To insure against data loss, users should replace batteries in accordance with the guidelines provided in the CPU Reference Manual, GFK-2222. Additionally, users could save logic and hardware configuration to flash. |
| **Extended Memory Types for IO Triggers** | %R, %W and %M cannot be used as IO triggers. |
| **GBC in Expansion Rack May Fail to Power Up** | Occasionally, a IC697BEM731 module located in an expansion rack may fail to power up when power to that rack is cycled off/on. The module's OK light will flash and then all module lights will go off. Power cycle the rack again to recover. |
| **Possible Machine Edition software inability to connect** | Infrequently, an attempt to connect a programmer to a PLC via Ethernet will be unsuccessful. The normal connection retry dialog will not be displayed. Rebooting the computer that is running the programmer will resolve the behavior. |
| **Repeated store of folder containing C blocks** | After many stores of a folder that contains C blocks, the PLC CPU and/or Ethernet module may cease operation. Power-cycle the main PLC rack to recover. The possibility of undesired operation may be avoided completely by power-cycling the main PLC rack after every 5$^{th}$ store of a C block folder. |
| **SNP Update Datagram message** | If an Update Datagram message requests 6 or less bits or bytes of data, the PLC will return a Completion Ack without Text Buffer. The protocol specifies that the returned data will be in the Completion Ack message, but it may not be. |
| **"Clear All" operation may time out** | A Clear All to a system with a very large hardware configuration may timeout, with the error:<br>Error 8097: Server Error - Transfer Error: Host driver timed out. [0x6A][0x01]<br>The selected memory could not be cleared<br>Machine Edition software does not disconnect when the error occurs and a retry is usually successful. |
| **Don't use multiple targets** | In a system in which the hardware configuration is stored from one target and logic is stored from a different target, powering-up from flash will not work. The observed behavior is that, following a power up from flash, Machine Edition software reports hardware configuration and logic "not equal". |
| **Nuisance Faults (GBC in configuration)** | Four "Non-critical CPU software event" faults may appear when some hardware configurations that contain GBC modules are stored. These faults may be ignored. |

| *Subject* | *Description* |
|---|---|
| **Sequence Store Failure** | In systems with very large hardware configuration, it is possible to encounter a “PLC Sequence Store Failure” error when writing the configuration to flash. To work around this error, either:<br>1. Perform an explicit clear of flash prior to performing the write.<br>2. Increase the operation timeout used by Machine Edition software prior to performing the write. |
| **Service Request 6: rounding of length parameter** | Processing for Service Request 6 C*hange/Read Number of Words to Checksum* incorrectly rounds the specified length to the next largest multiple of 8 bytes, rather than 8 words. Consequently, each sweep may checksum fewer words than expected. |
| **PID algorithm** | See “Documentation Errata” on page 23. For the case that bit 2 is set to 1 and bit 0 is set to 1, the product will operate in a manner opposite to the description. The derivative term is added when it should be subtracted. |
| **High Speed Counter Module Fails to Power Up Correctly** | Rarely, after some extreme power loss events, a High Speed Counter with interrupts enabled may fail to power up successfully. After failure, the HSC may continue to function but will cease to communicate with the PLC. There are no module fault indicators for this event and the HSC ready bit will remain ON. The user should power cycle again to restore normal function. |
| **Thermocouple Module Fails to Power Up Correctly** | After some power loss events, the Horner Thermocouple module (HE697THM160) may fail to power up successfully. After failure, the %AI data will not be updated correctly and will continue to return zero values. There are no module fault indicators for this event. The user should power cycle again to restore normal function. |
| **Fault Contacts on Modules in Expansion Rack** | When an expansion rack powers up, the slot fault contacts will prematurely indicate that the modules in the expansion rack are not faulted *before* they complete their power up. Use I/O point fault contacts to verify validity of the I/O. |
| **Fault Contacts on Remote I/O Station** | If multiple faults exist in a Series 90-70 Remote I/O Station and one of them is corrected, a FAULT contact that uses the Remote I/O Station’s module reference will incorrectly indicate that no faults exist at the Remote I/O Station. |
| **BIT_SEQ Function Block DIR Parameter** | The BIT_SEQ Function Block should require the user to flow BOOLEAN logic into the DIR parameter, but currently does not. If no DIR parameter is present, the BIT_SEQ will increment by default. |

## *Ethernet Restrictions and Open Issues*

| *Subject* | *Description* |
|---|---|
| **Number of SRTP Requests Tallied May Vary** | When running multiple SRTP client channels, the number of requests, as reported by the client and the server, may differ between the connections. |
| **SRTP Connections Remain Open After IP Address Changed** | The Ethernet Interface does not terminate all open SRTP connections before changing its IP address. Once the local IP address has changed, any existing open TCP connections are unable to normally terminate. This can leave SRTP connections open until their underlying TCP connections time out. If quicker recovery of the SRTP connection is needed, modify the “wkal_idle” Advanced User Parameter to reduce the TCP keep alive timer down to the desired maximum time for holding open the broken connection. Refer to *TCP/IP Ethernet Communications for PACSystems,* GFK-2224, for details. |
| **Reporting of Duplicate IP Address** | The RX7i does not log an exception or a fault in the PLC Fault Table when it detects a duplicate IP address on the network. |
| **REPP Does Not Save Results of Aborted PING** | The station manager REPP command does not retain the results of a PING that is aborted due to error. The PING results are reported when the PING is aborted, but subsequent REPP commands give the results of the last successfully terminated PING. |
| **Multiple Log Events** | The Ethernet Interface sometimes generates multiple exception log events and PLC Fault Table entries when a single error condition occurs. Under repetitive error conditions, the exception log and/or PLC Fault Table can be completely filled with repetitive error messages. |
| **Intermittent SNTP Loss of Synchronization** | Under moderately heavy EGD traffic load, the Ethernet Interface may occasionally lose synchronization with its SNTP time server and generate exception log event 29, entry 2=bH. |

| *Subject* | *Description* |
|---|---|
| **Reduced EGD Consumption with Large Numbers of Produced Exchanges** | When large numbers of EGD exchanges are produced at a rapid rate, some consumed EGD exchanges may exhibit lower rates of consumption than expected. To better balance produced and consumed EGD exchange performance, reduce the number or frequency of the produced exchanges configured at this Ethernet Interface. |
| **SRTP Communication Delays** | Average latency of communications on SRTP channels may vary considerably due to TCP retransmissions. SRTP client applications should be designed to take this variance into account. In particular, SRTP client applications migrating from Series 90-70 SRTP Servers to RX7i may need to lengthen SRTP timeout parameters. |
| **PLC Fault Table Last Update Date and Time** | The PLC Fault Table web page does not display the correct data for the PLC date and time field. The date and time displayed are the PCs local date and time, not the PLCs date and time. |
| **Spurious 'Ethernet Failure' Error** | On rare occasions, the error "Module hardware fault" may be reported on the Ethernet daughterboard. The corresponding fault in the exception log is Event = 1, followed by text "Ethernet failure". This fault is a nuisance fault and may be ignored. |
| **Web Server Failure Under Heavy Load** | After several hours of heavy load on the web server, the web server may fail to return pages and may cause a LAN system-software fault to be logged. The web server will resume serving pages when the load is reduced. |
| **Pushing Ethernet Restart Button Multiple Times** | Pushing the Ethernet Restart button multiple times rapidly without letting the Ethernet module complete the restart may cause the PLC to go lights out. The user should power cycle the CPU to recover. |
| **Reference Table Web Page Restriction** | After the user selects a user defined table, if the user then tries to go back to the pre-defined table of %R1-%R60, an error message may be displayed stating "An error was detected when trying to retrieve setting from PC cookie". |
| **Fault Table Web Page Restriction** | On both the I/O and PLC Fault Table web pages, the PLC program name is not currently displayed in the area provided. |
| **Cannot Set FTP Password** | The CHPARM TPASSWORD Station Manager command fails. Processing an AUP File containing parameter "tpassword" generates an error. |
| **Reference Table Web Page Format** | When using Netscape 4.7 to view the reference table web page, the size of the columns is incorrect. The first column is much wider than the others. |
| **Spurious Ethernet Fault** | In rare instances, after power cycle, the Ethernet Interface may log the following fault, Event = 28H, Entry 2 = 000eH. This fault can be safely ignored. |
| **Release 2.00 PLC Faults Are Not Identified on Web Page** | When any PLC Fault Table entries defined for Release 2.00 are displayed using the Ethernet interface web server, the PLC Fault description contains only a generic message instead of the proper fault text. |
| **Cannot send EGD Commands to Self** | EGD Commands return COMMREQ Status 8F90H (= invalid IP address) when addressed to initiating Ethernet Interface's own IP address. If you wish to send an EGD command to yourself, please use the loopback IP address (127.0.0.1). |
| **Unexpected EGD Commreq Status** | EGD Commands may return COMMREQ Status 9590H (= internal error) instead of the expected B190H (= Can't locate remote node) when unable to locate a remote device on the network. |
| **Too many EGD Commands Reported as Internal Error** | The Ethernet Interface supports 10 simultaneous EGD commands. When an 11$^{th}$ EGD Command COMMREQ is issued, the CSW value 9590H (= internal error) is returned. |
| **EGD Command Passwords Are Not Supported.** | Optional passwords are not allowed within EGD Command COMMREQs. |
| **Very Heavy EGD Production/Consumption at Server May Cause EGD Command Timeouts** | Very heavy EGD production and/or consumption at a server device may cause EGD command timeout errors when another device attempts to send EGD commands to that server. If EGD commands must preempt normal production, you may set the "gcmd_pri" Advanced User Parameter to 2 (see GFK-2224, Appendix A). Note that by doing so, EGD exchange production may be delayed. |
| **SRTP Server Errors Can Cause Timeouts at Channels Client** | The SRTP Server in the PACSystems Ethernet Interface can encounter various errors when the remote Series 90 PLC client takes down an SRTP connection and then establishes a new connection. This can cause unexpected channel timeout errors 0190H or 0290H at the client.<br>The SRTP server errors in the Ethernet exception log are identified as Event = 2; Entry 2 may be 001cH, or 0021H. |

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| *Subject* | *Description* |
|---|---|
| **EGD Command Range Failure Can Write Partial To PLC Bit Memory** | When an EGD Command attempts a write operation to a bit-mode PLC reference memory range (%I, %Q; %T, %M, %SA, %SB, %SC) where the amount of data be written exceeds the configured size of that reference memory, the command will return failure status but partial data may be written into the reference memory. The amount of partial data written depends upon the starting bit memory location and the data length as follows:<br>■ If data starts on a byte boundary (location = (8*n) + 1), no partial data is written.<br>■ If data does not start on a byte boundary (location = (8*n)+1) and data exceeds the configured reference memory by 8 or more bits, partial data is written from the starting location to the next byte boundary after the starting location.<br>■ If data does not start on a byte boundary (location = (8*n)+1) and data exceeds the configured reference memory by less than 8 bits, partial data is written from the stating location to the end of configured reference memory.<br>For a Write PLC Memory command, this can occur when writing data into the target PLC. For Read PLC Memory or Read Exchange commands, this can occur when writing data received from the target PLC into the local PLC memory. The logic application must not use any data returned to the local PLC if the EGD command status indicates failure.<br>To avoid writing partial data to the local or remote PLC, be sure that bit memory data transfers do not exceed the configured reference memory sizes at the appropriate PLC. |
| **Usage of New IP/Subnet Mask Configuration** | Because the Ethernet interface operates using a retained set of IP address + subnet mask information, a change to these values does not take effect until a restart of the module or power cycle of the rack containing the module. The user should be aware when altering these configuration values that their effect is not immediate. |
| **Cannot Change EGD Class 2 UDP Port Number** | Processing an Advanced User Parameter File containing parameter “gctl_port” does not actually change the value. |
| **COMMREQ Length Error** | The COMMREQ Status Word value 8190H (="COMMREQ is too short") may also be reported for EGD Command COMMREQs that are too long (contain more words than expected). |
| **Producer ID of Zero in Capabilities Response** | Producer ID is set to zero in the EGD Capabilities response if the IP address is set up by the “setIP” utility. Afterwards, any subsequent Hardware Configuration store will have the producer ID reported correctly. |
| **No CPU fault logged when Ethernet Interface in fatal blink code** | The CPU does not log any PLC or I/O Faults when the Ethernet Interface has a fatal blink code. The user’s application should monitor the LAN interface OK status bit to detect loss of module. |
| **EGD I/O has unexpected variability under heavy load** | EGD I/O has intermittent unexpected variability under heavy load. For a Produced Exchange, EGD samples may occasionally be delayed by as much as a production period. |
| **Ethernet Interface time drift** | If time synchronization is not configured for the Ethernet Interface, it loses time at a rate of approximately 0.3 seconds per hour. |
| **Clear of large hardware configurations may cause log event 08/20** | A Log event 08/20 may occur when very large hardware configurations are cleared and transfers are active on other Server connections. This log event can be safely ignored. |

## CPU Operational Notes

| Subject | Description |
|---|---|
| **User Memory Accounting Corrected** | Some user memory was not correctly accounted for in releases previous to Release 2.56. Due to this issue being corrected, it is possible that extremely large folders (>9Mb), which stored with PACSystems Release 1.0, 1.5 and 1.6 may not store with Release 2.56. In addition, if such a folder is resident in flash during the firmware upgrade to Release 2.56, the folder will not be read to RAM successfully. Users with large folders should insure that a current copy of the stored folder is archived using the programmer application software so that it can be modified and re-stored after the firmware upgrade, if necessary. |
| **Only One BTM Allowed in Main Rack** | Only one BTM is allowed in the main rack. Multiple BTMs in the main rack will result in undefined operation. |
| **Logic Executed in Row Major Instead of Column Major** | Logic execution in PACSystems RX7i is performed in row major order (similar to the Series 90-30) instead of column major (similar to the Series 90-70). This means that some complicated rungs may execute slightly differently on PACSystems RX7i and Series 90-70. For specific examples, see the programming software on-line help. |
| **Upgrading Firmware with Modules in Rack** | The process of upgrading the CPU firmware with the WinLoader utility may fail when multiple IO modules are in the main, remote or expansion racks, due to the time it takes to power cycle the rack system. If the upgrade process fails, move the CPU to a rack without IO modules and restart the upgrade process. |
| **NaN Handled Differently Than in 90-70** | The PACSystems RX7i CPU may return slightly different values for Not A Number as compared to Series 90-70 CPUs. In these exception cases (e.g., 0.0/0.0), power flow out of the function block is identical to Series 90-70 operation and the computed value is still Not A Number. |
| **PID Algorithm Improved** | The PID algorithm used in PACSystems RX7i has been improved and therefore PID will function slightly differently on PACSystems RX7i than on the Series 90-70. The differences are:<br>■ The elapsed time is computed in 100 µS instead of 10 mS units. This smooths the output characteristic, eliminating periodic adjustments that occurred when the remainder accumulated to 10mS.<br>■ Also, previous non-linear behavior when the integral gain is changed from some value to 1 repeat/second was eliminated. |
| **Service Request 13 Command Block Must Contain Zero** | When the Service Request function block is used to invoke Service Request #13, the first word of the command block sets the number of last scans to be executed. If the value of that word is -1 (or 0xFFFF), then the number of last scans is set to the value in the configuration. |
| **Changing IP Address of Ethernet Interface While Connected** | Storing a hardware configuration with a new IP address to the RX7i while connected via Ethernet will succeed, then immediately disconnect because the RX7i is now using a different IP address than the Programmer. You must enter a new IP address in the Target Properties in the CME Inspector window before reconnecting. |
| **Stack Allocation for Folders Converted from Series 90-70 Must be Increased** | Series 90-70 folders are converted to PACSystems RX7i with the same stack allocation. PACSystems RX7i uses more stack space than the Series 90-70, so some folders may not run after conversion. To increase the stack space, right click the _MAIN block and select Properties. Stack Size is listed at the bottom of the Properties page. The default stack size in new PACSystems RX7i folders is 64KB. Folders with a large number of nested calls may need more stack space. As a general rule, the stack for the converted PACSystems RX7i folder should be set to approximately three times the stack size of the Series 90-70 version of the folder. A diagnostic fault will be displayed if the folder runs out of stack space. |
| **Duplicate Station Address for Modbus Will Conflict with Other Nodes** | The default serial protocol for the RX7i is Modbus RTU. The default Station Address is 1. If the PLC is added to a multi-drop network, care must be taken that the PLC is configured with a unique Station Address. Nodes with duplicate Station Addresses on the same network will not work correctly. |
| **FST_EXE No Longer Represented by %S121** | The PACSystems RX7i implementation of #FST_EXE is different from the Series 90-70 implementation. #FST_EXE is no longer stored in %S (%S121) memory. Instead, it is stored in a local memory that is not accessible to the user. You can reference #FST_EXE only by using its name (similar to referencing a symbolic variable).<br>The #FST_EXE system variable can be accessed (read) in the logic of any block. Just as in the Series 90-70, PSB blocks and C blocks inherit the #FST_EXE value of their calling block. Again, as in the Series 90-70, #FST_EXE cannot be written. |

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| *Subject* | *Description* |
|---|---|
| **Format for Fault Locating References Changed** | Compared to the Series 90-70 CPU, syntax for the fault locating references has changed as follows:<br>#RACK_00r is now #RACK_000r.<br>#SLOT_rss is now #SLOT_0rss.<br>#BUS_rssb is now #BUS_0rssb.<br>#M_rssbmm is now #M_rssbmmm (adds support for 256 modules).<br>Existence of old style (Series 90-70) fault locating references will cause errors to be generated during logic validation. The error generated will have the following format: “Error 9618: Invalid reference type for operand [LD Block,’_MAIN’: Rung 7]” |
| **Slot Restrictions for Analog Expander Module in RX7i Rack** | The following restrictions apply to Analog Expansion Modules in a PACSystems RX7i rack:<br>The base module must be in a slot no lower than Slot 4.<br>The expander module must be in a slot no higher than Slot 11.<br>No expander module may be in a slot lower than the base module.<br>Because of these restrictions, and because the 90-70 modules occupy two slots in the PACSystems RX7i rack, a maximum of three expanders are possible. (Base in Slot 4, Expanders in Slots 6, 8, and 10 or Base in Slot 5, Expanders in Slots 7, 9, and 11.) Please note that these restrictions do not apply to Analog Expansion Modules in Series 90-70 Expansion Racks. |
| **Genius Bus Controller Restrictions** | The following restrictions apply to GBCs in PACSystems RX7i:<br>■ The minimum CPU sweep time will be gated by the time it takes the GBC to refresh its outputs and collect its inputs + 500 microseconds. To obtain a smaller sweep time, use the SUSIO function block or place the GBCs in a scan set that has non-default characteristics.<br>■ If a %W reference address is used for COMM_REQ status or return data, it must be in the range %W00001 - %W65536.<br>■ Storing or clearing a hardware configuration containing two GBCs attached to the same Genius network may cause a Loss of Device fault for one of the GBCs. This is caused by the GBCs clearing their SBAs asynchronously. The user can safely ignore the Loss of Device fault. |

| *Subject* | *Description* |
|---|---|
| **Communication Coprocessor Module Restrictions** | PACSystems RX7i CPUs with firmware versions 1.50 or later support IC697CMM711 modules with firmware versions 4.20 or later. You must ensure that you are using the correct firmware version of the CMM because the CPU cannot check the CMM's firmware version. (The module's firmware version can be found on a label attached to the module's EEPROM.)<br>PACSystems **does not** support the following for an IC697CMM711:<br>■ Connecting to Machine Edition to the CPU through the CMM's serial ports.<br>■ Access to Symbolic variables memory.<br>■ WAIT mode COMMREQs.<br>■ Permanent datagrams.<br>The following restrictions apply when using the IC697CMM711 with PACSystems:<br>■ Access to %W memory references is partially supported. Only offsets 0—–65535 of %W can be accessed via the CMM.<br>■ The Program Name is currently always LDPROG1 for PACSystems.<br>■ Reads and writes beyond currently configured reference table limits will report a minor code error of 90 (REF_OUT_OF_RANGE) instead of F4 (INVALID_PARAMETER) as reported on the Series 90-70.<br>■ In case of ERROR NACK, the Control Program number, privilege level and other piggyback status data will be set to 0.<br>■ PACSystems CPUs return the major/minor type of the 90-70 CPX935 (major type 12, minor type 35) to the CMM scratch pad memory when communicating with a CMM.<br>■ Control Program Number will be returned as 01 in PACSystems instead of FF as reported on the Series 90-70.<br>■ If your RX7i application program needs to access the dual port memory of a CMM, use the BUS READ and WRITE functions. When accessing the CMM, set the Region parameter on the function block to 1. (For the CMM, region 1 is predefined to be the module's entire dual port memory.)<br>**Note:** For details on operation of the IC697CMM711, refer to the *Serial Communications User's Manual,* GFK-0582. |

| *Subject* | *Description* |
|---|---|
| **Programmable Coprocessor Module Restrictions** | PACSystems RX7i CPUs with firmware versions 1.50 or later support IC697PCM711 modules with firmware versions 4.05 or later. You must ensure that you are using the correct firmware version of the PCM because the CPU cannot check the PCM's firmware version. (The module's firmware version can be found on a label attached to the EEPROM.)<br>PACSystems does not support the following for IC697PCM711:<br>■ Connecting Machine Edition to the CPU through the IC697PCM711 module's serial ports.<br>■ Access to Symbolic variables.<br>■ WAIT mode COMMREQs.<br>■ The following C functions are not supported:<br>chk_genius_bus<br>chk_genius_device<br>get_cpu_type_rev<br>get_memtype_sizes<br>get_one_rackfault<br>get_rack_slot_faults<br>■ The C function write_dev will not write to read only reference tables (%S references, transition bits, and override bits). If this is attempted, the call will fail at run time and return an error code.<br>The following restrictions apply when using the IC697PCM711 with PACSystems:<br>■ %W memory partially supported. Only offsets 0-65535 of %W can be accessed via the PCM.<br>■ The Program Name is currently always LDPROG1 for PACSystems.<br>■ In case of ERROR NACK, the Control Program number, privilege level and other piggyback status data will be set to 0.<br>■ If an application program running on the PCM accesses the VME bus, the VME addresses being used by that program must be updated to agree with the PACSystems RX7i VME addressing assignments. PACSystems RX7i VME address assignments are described in the *PACSystems RX7i User's Guide to Integration of VME Modules,* GFK-2235.<br>■ PACSystems CPUs return the major/minor type of the Series 90-70 CPX935 (major type 12, minor type 35) to the PCM scratch pad memory when communicating with a PCM.<br>■ If your RX7i application program needs to access the PCM's dual port memory, use the BUS READ and WRITE functions. When accessing the PCM, set the Region parameter on the function block to 1. (For the PCM, region 1 is predefined to be the module's entire dual port memory.)<br>**Note:** For details on operation of the IC697PCM711, refer to the *Programmable Coprocessor Module and Support Software User's Manual,* GFK-0255. |

| *Subject* | *Description* |
|---|---|
| **PCM (to CPU) Communications Timeout** | The PCM has a default backplane communications timeout value of 5 seconds. After the PCM has sent a request to the CPU, the PCM applies this timeout while waiting on a response back from the CPU. In most cases, the CPU will respond well within the 5–second timeout; however, in certain instances the CPU can take longer than 5 seconds to respond. These cases are limited to LOADs or STOREs of program and/or configuration -especially if blocks in the program are larger than 8 KBytes. Folders containing EXE blocks (again with *.EXE files >8 KBytes) are most likely to cause problems. To ensure that the PCMs do not observe backplane timeouts, a file must be loaded (using termf) to the PCM. The file must be a binary file named CPU.ENV. The contents of this file are as below (all values are specified in hexadecimal):<br><br>Once the binary file CPU.ENV (below) is created, use termf to load CPU.ENV to the PCM. Then execute a soft reset of the PCM. After executing the soft reset, the PCM's backplane communications timeout should be 10 seconds.<br><br>**Note:** A copy of the above CPU.ENV file can be obtained from http://www.geindustrial.com/cwc/gefanuc/support/ControllersIO/s9070-d.htm.<br><br>**CAUTION**<br><br>**The CPU.ENV file will not be used when a hard reset is performed on the PCM. With the CPU.ENV file resident in the PCM, a soft reset must be performed after every hard reset of the PCM. Be aware that it is possible to issue a soft reset COMMREQ from the Ladder Diagram application; therefore, the application can be modified to handle the required reset of PCMs after a power cycle of the PLC system.** |

| File Offset | Data | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0000 | 4C | 5A | 01 | 01 | 00 | 00 | 00 | 00-00 | 00 | 00 | 00 | 01 | 00 | 00 | 00 | LZ. . . . . |
| 0010 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00-00 | 00 | 43 | 50 | 55 | 4C | 49 | 4E | . . . . . C P U L I N |
| 0020 | 4B | 2E | 43 | 4F | 44 | 00 | 2D | 62-00 | 36 | 34 | 00 | 2D | 74 | 00 | 32 | K . C O D . –b . 6 4 .–t . 2 |
| 0030 | 30 | 30 | 00 | 00 | 43 | 50 | 55 | 4C-49 | 4E | 4B | 2E | 44 | 43 | 42 | 00 | 00 . .C P U L I NK . D C B . |
| 0040 | 00 | 4E | 55 | 4C | 4C | 3A | 00 | 4E-55 | 4C | 4C | 3A | 00 | 4E | 55 | 4C | . N U L L: . N U L L : . N U L |
| 0050 | 4C | 3A | 00 | 00 | 00 | 00 | 00 | 00-00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | L : . . . . . |
| 0060 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00-00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | . . . . . |
| 0070 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00-00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | . . . . . |

| | |
|---|---|
| **DLAN/DLAN+ (Drives Local Area Network) Interface Restrictions** | PACSystems RX7i CPUs with firmware versions 1.50 or later support DLAN Interface, IC697BEM763 modules with firmware versions 3.00 or later. You must ensure that you are using a valid version of the DLAN firmware because the CPU cannot check the DLAN's firmware version. (The module's firmware version can be found on a label attached to the EEPROM.)<br><br>■ If your RX7i application program needs to access the DLAN's dual port memory, use the BUS READ and WRITE functions. When accessing a DLAN module, set the Region parameter on the function block to 1. (For the DLAN module, region 1 is predefined to be the module's entire dual port memory.)<br><br>■ The DLAN is only supported in the main RX7i rack. It is not supported in expansion racks.<br><br>**Note:** The DLAN Interface module is a specialty module with limited availability. If you have a DLAN system, refer to the *DLAN/DLAN+ Interface Module User's Manual,* GFK-0729 for details. |
| **Backplane Comm window Setting and Genius Redundancy** | When using Genius Redundancy, do not set the backplane communications window timer to 0. Also be sure to allow enough time for the backplane communications window to run when using Constant Sweep mode. Ample backplane communications window time must be available for the GBCs to exchange information about Genius devices that are lost and added. |
| **Expansion Rack ID** | Series 90-70 expansion racks are shipped with the rack ID strapped for rack 0 (the main rack). If the rack jumper is not changed the PLC CPU will not recognize the rack at all and may not properly identify the error. |

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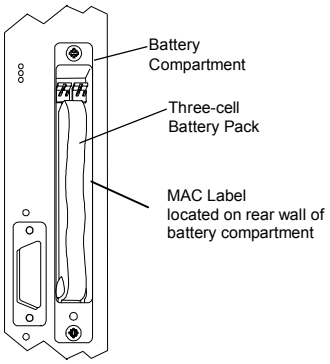
| *Subject* | *Description* |
|---|---|
| **Expansion Rack Cable** | Connection and disconnection of an expansion rack cable while the CPU is running should not be attempted. This will cause the PLC to go to the STOP/HALT state. |
| **Expansion Rack Power** | Expansion racks should be powered up at the same time the main rack is powered up or they should be powered up after the main rack has completed its power up initialization. Do not power up an expansion rack while the PLC CPU is running power-up diagnostics. |
| **Timer Operation** | Care should be taken when timers (ONDTR, TMR, and OFDTR) are used in program blocks that are NOT called every sweep. The timers accumulate time across calls to the sub-block unless they are reset. This means that they function like timers operating in a program with a much slower sweep than the timers in the main program block. For program blocks that are inactive for large periods of time, the timers should be programmed in such a manner as to account for this catch up feature.<br>Related to this are timers that are skipped because of the use of the JUMP instruction. Timers that are skipped will NOT catch up and will therefore not accumulate time in the same manner as if they were executed every sweep. |
| **Constant Sweep** | Constant Sweep time, when used, should be set at least 10 milliseconds greater than the normal sweep time to avoid any over-sweep conditions when monitoring or performing on-line changes with the programmer. Window completion faults will occur if the constant sweep setting is not high enough. |
| **Large Number of COMM_REQs Sent to Module in One Sweep Causes Faults** | A large number of COMM_REQs (typically greater than 8) sent to a given board in the same sweep may cause Module Software faults to be logged in the PLC fault table. The fault group is MOD_OTHR_SOFTWR (16t, 10h) and the error code is COMMREQ_MB_FULL_START (2). When this occurs, the “FT” output of the function block will also be set. To prevent this situation, COMM_REQs issued to a given board should be spread across multiple sweeps so that only a limited number (typically 8 or less) of COMM_REQs are sent to a given board in each sweep. In addition, the FT output parameter should be checked for errors. If the FT output is set (meaning an error has been detected), the COMM_REQ could be re-issued by the application logic. |
| **C Block Standard Math Functions Do Not Set errno** | In C Blocks, standard math functions (e.g. sqrt, pow, asin, acos) do not set errno to the correct value and do not return the correct value if an invalid input is provided. |
| **Loss of VDD100 or VAL132 After Multiple Power Cycles** | In rare instances, a VDD100 or VAL132 module may not configure after power has cycled repeatedly in a very brief period of time. A Loss of IO Module fault will be generated.<br>In extremely rare instances, this may also cause other modules to fail to configure, without generating additional loss of module faults. These additional failures may cause communication with the Ethernet Interface to fail.<br>The user can recover from either of these cases by turning off power for at least 5 seconds and then restoring power. This will provide sufficient "off-time" to ensure that all modules can powerup properly. |
| **Sweep Impact Times for V-Series I/O** | ***Sweep Impact Times (microseconds)*** |

| | ***CPE010*** | | ***CPE020*** | |
|---|---|---|---|---|
| | ***Main Rack*** | ***Main Rack (Inc)*** | ***Main Rack*** | ***Main Rack (Inc)*** |
| VAL132 | 87 | 77 | 55 | 51 |
| VAL264 | 106 | 96 | 72 | 70 |
| VAL301 | Not available | Not available | Not available | Not available |
| VDD100 | 70 | 60 | 35 | 32 |
| VDQ120 | 72 | 49 | 39 | 36 |
| VDR151 | 84 | 58 | 43 | 38 |
| VRD008 | 86 | 75 | 46 | 41 |

## *Ethernet Operational Notes*

| *Subject* | *Description* |
|---|---|
| **MAC address** | A label on the rear wall inside the CPU's battery compartment identifies the MAC address assigned to the CPU's embedded Ethernet Interface. The label is visible when the battery is removed from its compartment. (The battery does not need to be disconnected to temporarily remove it from the compartment.)<br>  <br> |
| **Configuration of IP Address is Required Before Using Ethernet Communications** | The Ethernet Interface within the CPU module cannot operate on a network until a valid IP address is configured. The necessary Ethernet addressing information must be configured prior to actual network operation, or to recover from inadvertent changes to the Ethernet addressing data at the Ethernet Interface. Use one of the following methods to initially assign an IP address:<br>■ Connect a serial terminal to the Station Manager port of the PACSystems RX7i . Then use the CHSOSW command to enter the desired IP address. For details, see the *PACSystems TCP/IP Communications Station Manager* manual, GFK-2225.<br>■ Temporarily assign an IP address to the module using the SetIP tool over the Ethernet network. For details, see *TCP/IP Ethernet Communications for PACSystems,* GFK-2224.<br>■ The Ethernet Interface automatically obtains a temporary IP Address from a BOOTP server on the network. For details, see *TCP/IP Ethernet Communications for PACSystems,* GFK-2224.<br>Once a temporary IP address has been set up, the Ethernet Interface can be accessed over the network (such as by the Machine Edition programming software). The programmer should then be used to configure the proper IP address for the Ethernet Interface. |
| **Proper IP Addressing is Always Essential** | The PACSystems RX7i CPU's embedded Ethernet Interface must be configured with the correct IP Address for proper operation in a TCP/IP Ethernet network. Use of incorrect IP addresses can disrupt network operation for the PACSystems RX7i and other nodes on the network. Refer to TCP/IP Ethernet Communications for the PACSystems RX7i, GFK-2224 for important information on IP addressing. When storing a new HW configuration to the RX7i, be sure that the HW configuration contains the proper Ethernet addressing data (IP Address, Subnet Mask, and Gateway IP Address) for the RX7i.<br>**Note:** Machine Edition programming software maintains the target IP address (used to connect the programmer to the target) independent of the contents of the HW Configuration for that target. The target IP address is set in the Target Properties in the CME Inspector window. Storing a HW Configuration whose Ethernet addressing data contains an IP Address that is different from the RX7i target IP address will change the IP address used by the target RX7i as soon as the Store operation is completed; this will break the Programmer connection. Before attempting to reconnect the Programmer, you must change the target IP address in the Target Properties in the CME Inspector window to use the new IP address. To regain communication at the former IP address, use the manual corrective action described above.<br>Storing a HW Configuration containing default (0.0.0.0) or incorrect Ethernet addressing data to the PACSystems RX7i will result in loss of the Programmer connection and will require manual corrective action as described above. |
| **Default IP Address (0.0.0.0) Attempts to Set IP Address via BOOTP** | The default IP address value (0.0.0.0), whether obtained from HW Configuration or backup configuration, causes the Ethernet Interface to request a temporary IP address from a BOOTP server device on the network. |

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| *Subject* | *Description* |
|---|---|
| **LAN Must be Tree, Not Ring** | The two Ethernet network ports on the PACSystems RX7i Ethernet Interface must not be connected, directly or indirectly, to the same network device. The hub or switch connections in an Ethernet network must form a tree and not a ring; otherwise duplication of packets and network overload may result. In this situation, the RX7i Ethernet modules will continually reset. |
| **Reporting of Duplicate IP Address** | The PACSystems RX7i does not log an exception or a fault in the PLC Fault Table when it detects a duplicate IP address on the network. |
| **Multiple Zero Period EGD Exchanges May Not Produce Similar Numbers of Samples** | If more than one EGD produced exchange is configured for a production period of zero, the exchanges may not produce similar numbers of samples. Due to the way that scheduling occurs when multiple exchanges are scheduled "as fast as possible," some zero period exchanges may produce significantly more samples than others. For more consistent EGD production, configure the produced EGD exchanges with non-zero production periods. |
| **Changing IP Address While SRTP Connection Open May Generate Log Events** | Open SRTP Server connections established with a remote SRTP client are not terminated as expected when the RX7i's IP address is changed (typically by storing a new HW Configuration to the RX7i). A Series 90 SRTP client ("SRTP channels") reports either a 9690H or 0190H status; the SRTP connection may remain open until the connection is terminated as a result of a client timeout. |
| **Series 90-70 Datagrams are Not Supported** | Series 90-70 datagrams are not supported. This means that Series 90-70 - format variable list requests from Host Comm Toolkit applications will fail. (Series 90-30 – format datagrams are supported, but cannot access %P or %L memory in the RX7i.) |
| **AUP Parameter Should Not be Changed** | The Advanced User Parameter "wsnd_buf" should not be changed by the user. Changing the value of this parameter may cause the LAN LED to go out and the Ethernet Interface to drop connection. |
| **Heavy Load Can Block Station Manager** | As explained in *TCP/IP Communications for PACSystems Station Manager Manual,* GFK-2225, Chapter 1, a heavy EGD and/or SRTP load can block Station Manager operation. |
| **One-time delay of EGD Production (and possibly Consumption) if more than 24 SRTP Server Connections are started simultaneously** | If more than 24 SRTP Server connections are established simultaneously, EGD Production may be briefly delayed for each connection after the 24th when the connections are first made after power is applied. If EGD consume acceleration has been disabled, then EGD Consumption will also be delayed. The delay only occurs once when the SRTP Server connection is established for the first time after Powerup. No delay is experienced for the first 24 SRTP Server connections. |
| **Web Server Browser Restrictions** | Internet Explorer version 4.0 running on Windows 98 will give an error when the reference table web page is accessed. Web Server operation has been verified with Internet Explorer version 5.0 |
| **Very Heavy EGD Production/Consumption at Server May Cause EGD Command Timeouts** | Very heavy EGD production and/or consumption at a server device may cause EGD command timeout errors when another device attempts to send EGD commands to that server. If EGD commands must preempt normal production, you may set the "gcmd_pri" Advanced User Parameter to 2 (see GFK-2224, Appendix A). Note that by doing so, EGD exchange production may be delayed. |
| **AUP Parameter Name Change** | Beginning with Release 2.00, the following Advanced User Parameters have been renamed to match the Ethernet hardware port identification:<br>"`lduplex1`" is changed to "`lduplex1a`" (Ethernet Port 1A duplex state)<br>"`lduplex2`" is changed to "`lduplex1b`" (Ethernet Port 1B duplex state)<br>"`lspeed1`" is changed to "`lspeed1a`" (Ethernet Port 1A network speed)<br>"`lspeed2`" is changed to "`lspeed1b`" (Ethernet Port 1B network speed)<br>The old parameter names are no longer supported; use of an obsolete parameter name will result in a configuration processing error and an Ethernet exception (Entry = 2, Entry 2 = 06).<br>Existing AUP files using the obsolete parameter names will have to be changed to use the new parameter names. |

| *Subject* | *Description* |
|---|---|
| **SRTP Application Timeouts Must Accommodate Network Connection Overhead** | The application timeouts within SRTP Channels also include the time needed to establish and maintain the underlying network and SRTP connection. Examples are establishing the TCP connection for a new channel, establishing communication with the remote device, and TCP retransmissions during Channel operations. If the time needed for TCP connection establishment or maintenance exceeds the user-specified channel application timeout values, an application timeout will occur. Channel application timeouts are temporary errors; the channel continues to run. |
| **Client Channels TCP Resource Management** | The OS Network stack hangs on to the TCP resources associated with a connection for a period of time after the connection is closed. It applies to the initiator of the close, which is almost always the client side. This time is referred to as the "TCP Linger Period". Once the TCP Linger Period expires (60 seconds in the current OS implementation), the TCP resources are released. Application developers using client channels need to be aware of this behavior when designing their logic. A finite number of TCP resources are allocated to client channels, and if channel connections are brought up and down so fast that these resources are depleted, then the application may have to wait until a TCP resource frees up in order to establish another client channel (a COMMREQ Status of 0xA890 is returned if no TCP resources are currently available; application should wait and try again).<br><br>SRTP Client Channels provides features that help the user preserve TCP connections. These include a period time where one can establish an SRTP Channel and specify the channel to run at a given interval, or run as fast a possible. One can also specify a number of iterations, or allow the channel to run forever. Additionally, SRTP Channels allows channel re-tasking of an active channel to the same remote device, where the parameters of an active channel, such as changing the channel command type (Read/Write), number of repetitions, time periods, local memory address, remote memory address, etc. can be changed. SRTP Channels also allows channel re-tasking of an active channel to a different remote device (changing the remote device's IP address, etc.). However, re-tasking to a different remote device will neither conserve TCP connections, nor save on the time it takes to create a channel. |
| **Idle Modbus/TCP connection between a Series 90 and a PACSystems may be prematurely terminated** | An idle Modbus/TCP connection between a Series 90 and a PACSystems may be prematurely terminated. There is an incompatibility between the TCP "Keep-Alive" timer values on the PACSystems Ethernet Interfaces and Series 90 Ethernet Interfaces. The issue is that the default value of the keep-alive timer for the Series 90 modules is set to a much higher value than for the PACSystems.<br><br>To keep TCP connections open between a Series 90 Ethernet Interface and a PACSystems Ethernet Interface, the Series 90 Interface Advanced User Parameter wkal_time should be set to the value 750 to match that of the PACSystems. With this change, TCP connections remain open indefinitely. Note that this same issue occurs for SRTP Client Channels that have infrequent traffic and can be resolved by using the same technique. |
| **Attempt to open 17 or more Modbus server connections may appear successful** | If more than the maximum 16 supported Modbus Server Connections are attempted, the TCP connection may succeed, but no data may be subsequently transferred. |

## *Product Documentation*

*PACSystems RX7i CPU Reference Manual,* GFK-2222
*PACSystems RX7i Installation Manual,* GFK-2223
*TCP/IP Ethernet Communications for PACSystems,* GFK-2224
*PACSystems TCP/IP Station Manager Manual,* GFK-2225
*PACSystems RX7i User's Guide to Integration of VME Modules,* GFK-2235
*PACSystems RX7i C Toolkit User's Guide,* GFK-2259
*PACSystems Hot Standby CPU Redundancy User's Guide,* GFK-2308
*PACSystems RX7i Memory Xchange Modules,* GFK-2300
*Proficy™ Machine Edition Getting Started,* GFK-1868
*Logic Developer – PLC Programming Software Getting Started,* GFK-1918
*Important Product Information, PACSystems RX7i CPUs*, GFK-2244Q (this document)

## Documentation Errata

**GFK-2222,** *PACSystems RX7i CPU Reference Manual*: Chapter 10, "PID Function," Section "PID Algorithm Selection (PIDISA or PIDIND) and Gains"

The description of the Derivation term should be replaced/augmented with this text:

The Derivative term is the time rate of change of the Error term in the interval since the last PID solution.

Derivative = ΔError / dt = (Error – previous Error) / dt,

where

dt = Current PLC elapsed time - PLC elapsed time at previous PID solution.

In normal mode (that is, without Reverse-Action mode), this is the change in the error term.

(Error – previous Error) = (SP – PV) – (previous SP – previous PV)
= (previous PV – PV) – (previous SP – SP)

However, when the Reverse-Action mode bit in the Config Word is set, the sign of the change in the error term is reversed.

(Error – previous Error) = (PV – SP) – (previous PV – previous SP)
= (PV – previous PV) – (SP – previous SP)

The change in the error term depends on changes in both the Set Point and the Process Variable. If the Set Point is constant, the difference between SP and the previous SP is zero and has no effect on the output. However, Set Point changes can cause large transient swings in the derivative term and hence the output. Loop stability may be improved by eliminating the effect of Set Point changes on the derivative term. Set the third bit (bit 2) of the Config Word to 1 to calculate the Derivative based only on the change in PV. For bit 2 set in normal mode (bit 0=0).

(Error – previous Error) = (previous PV – PV),

and with bit 2 set in Reverse-Action mode (bit 0 = 1),

(Error – previous Error) = (PV – previous PV).

For information about a related open issue, see "PID Algorithm" on page 11.

## Installation in Hazardous Locations

***The following information is for products bearing the UL marking for Hazardous Locations:***

- WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2;
- WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES; AND
- WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.
- EQUIPMENT LABELED WITH REFERENCE TO CLASS I, GROUPS A, B, C, & D, DIV. 2 HAZARDOUS LOCATIONS IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C, D OR NON-HAZARDOUS LOCATIONS ONLY.